

REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claims 1 and 11 have been amended to limit the liquid medium including no hydrogen atom to a saturated hydrocarbon in a molecule of which a hydrogen atom or hydrogen atoms are all substituted with a fluorine atom or fluorine atoms. No new matter has been added to the application by these amendments.

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

The rejection of claims 1, 3-13, 15 and 16 under 35 U.S.C. § 103(a) as being unpatentable over Higuchi et al. in view of Noguchi et al. and Kusano et al. is respectfully traversed.

The Examiner takes the position that Higuchi et al. and Noguchi et al. disclose the known process of surface treating an inner surface of a vacuum member by first mechanically polishing the vacuum member with a liquid medium containing hydrogen atoms, then subjecting the vacuum member to a chemical or electrochemical polishing process. The Examiner admits that neither reference teaches a liquid medium absent of any hydrogen atoms, wherein said liquid medium is a hydrocarbon in a molecule of which the hydrogen atom(s) are all substituted with fluorine atom(s).

The Examiner states that Kusano et al. teach a surface treatment method including an unsaturated hydrocarbon compound under ordinary pressure and ordinary temperature, wherein the hydrogen atoms are replaced with fluorine atoms. The Examiner admits, however, that the compound disclosed by Kusano et al. is a gaseous compound.

The Examiner takes the position that regardless of the medium, (gas, liquid, or even solid) since Kusano et al. teach a compound having the same effect or benefit as claimed by Applicant, which is to impart a smooth surface on the workpiece, the mediums could be interchangeable. Further, the Examiner asserts that it would have been obvious to modify the liquid medium used in the processes of Higuchi et al. and Noguchi et al. with a liquid medium formed as an unsaturated hydrocarbon compound under ordinary pressure and ordinary temperature, wherein the hydrogen atoms are replaced with fluorine atoms, based on Kusano et al.

As stated above, Applicants have amended independent claims 1 and 11 to limit the liquid medium including no hydrogen atom to a saturated hydrocarbon in a molecule of which a hydrogen atom or hydrogen atoms are all substituted with a fluorine atom or fluorine atoms. None of the cited references, nor a combination thereof, teach or suggest Applicants' recited liquid medium.

Noguchi et al. disclose the process of surface treating an inner surface of a metallic hollow body by polishing chemically and electrochemically with one or more polish liquid selected from fluoric acid, a sulfuric acid, a nitric acid, a phosphoric acid, a chromic anhydride, a sodium hydroxide and sodium phosphate.

Higuchi et al. disclose the process of surface treating an inner surface of a metallic hollow body by first mechanically polishing the inner surface with a liquid medium such as water, a surfactant and alkali, then subjecting the inner surface to a chemical or electrochemical polishing process.

However, as admitted by the Examiner, neither Noguchi et al. nor Higuchi et al. teach or suggest the use of a liquid medium which is a saturated hydrocarbon wherein all of said hydrogen atoms are replaced by fluorine atoms.

Kusano et al. disclose that the plasma treatment with a fluorinated saturated hydrocarbon, such as CF_4 and C_2F_6 , achieves water repellency to a less satisfactory extent, in that water repellency diminishes within a relatively short time. (See column 1, lines 25-28 and 42-60 of the reference.) Namely, Kusano et al. teach that a surface treatment with a fluorinated saturated hydrocarbon does not achieve a satisfactory effect. On the other hand, Kusano et al. also disclose that, "[i]n the surface treatment ... the inventors have found that effective surface energy lowering is accomplished when ... hexafluoropropylene (HFP) and similar unsaturated fluorinated hydrocarbons are used as the fluorinated compound." (See column 2, lines 23-31 of the reference.) (Emphasis added.) Namely, Kusano et al. teach that a surface treatment with a fluorinated unsaturated hydrocarbon achieves a satisfactory effect.

In view of the teachings of Kusano et al., one of ordinary skill in the art has no motivation to use a saturated hydrocarbon for a surface treatment process wherein all of said hydrogen atoms are replaced by fluorine atoms, since Kusano et al. teach that a surface treatment with a fluorinated saturated hydrocarbon does not achieve a satisfactory effect. MPEP 2145(X)(D) explains that references must be considered in their entirety,

including disclosures that teach away from the claims. As stated above, Kusano et al. teach away from the use of a saturated hydrocarbon, as required by Applicants' claims.

In addition, as also admitted by the Examiner, Kusano et al. use a gaseous medium for the surface treatment, whereas Applicants clearly recite a liquid medium for the surface treatment. Kusano et al. neither disclose nor suggest using liquid medium for a surface treatment. Further, although the Examiner asserts that mediums (gas, liquid or solid) could be interchangeable, the Examiner has provided no evidence to support this assertion, or to show that such a change would even be successful.

Furthermore, Applicants' invention has surprisingly superior effects. Specifically, surface-treating a vacuum member in the presence of a liquid medium of a saturated hydrocarbon wherein all of said hydrogen atoms are replaced by fluorine atoms prevents occlusion of hydrogen. Additionally, surface treating a vacuum member in the presence of Applicants' recited liquid medium makes it possible to provide a high performance vacuum member showing a high Q-value under high accelerating electric field.

For example, Test Example 1, on pages 28-30 of Applicants' specification, demonstrates that mechanical polishing with Fluorinert FC-77 as a liquid medium greatly suppresses occlusion of hydrogen as a solid solution into a member to be polished. (Please also see Table 2 on page 30 of Applicants' specification.) Additionally, Example 1 on pages 35 and 36 of Applicants' specification demonstrates that polishing with water results in a reduction in Q-value with a rise in an accelerating electric field. On the contrary, polishing with Fluorinert FC-77 as a liquid medium results in no reduction in Q-value, even with a rise in accelerating electric field. Thus, the use of a saturated hydrocarbon wherein all of said hydrogen atoms are replaced by fluorine atoms as a liquid medium makes it possible to produce a vacuum member with a high acceleration performance. None of the cited references, nor a combination thereof, teaches or suggests these advantages.

For these reasons, the invention of claims 1, 3-13, 15 and 16 is clearly patentable over the cited combination of references.

Therefore, in view of the foregoing amendments and remarks, it is submitted that the ground of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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March 28, 2007